

in Figure O5. No part of the foot or tibia may contact any exterior surface.

(3) Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur.

(4) Guide the pendulum so that there is no significant lateral vertical or rotational movement at the time of initial contact between the impactor and the knee.

(5) The test probe velocity at the time of contact shall be  $2.1 \pm 0.03$  m/s ( $6.9 \pm 0.1$  ft/s).

(6) No suspension hardware, suspension cables, or any other attachments to the probe, including the velocity vane, shall make contact with the dummy during the test.

[65 FR 10968, Mar. 1, 2000, as amended at 67 FR 46415, July 15, 2002]

#### § 572.137 Test conditions and instrumentation.

(a) The test probe for thoracic impacts, except for attachments, shall be of rigid metallic construction and concentric about its longitudinal axis. Any attachments to the impactor, such as suspension hardware, impact vanes, etc., must meet the requirements of § 572.134(c)(7). The impactor shall have a mass of  $13.97 \pm 0.23$  kg ( $30.8 \pm 0.05$  lbs) and a minimum mass moment of inertia of  $3646 \text{ kg-cm}^2$  ( $3.22 \text{ lbs-in-sec}^2$ ) in yaw and pitch about the CG of the probe. One-third (1/3) of the weight of suspension cables and any attachments to the impact probe must be included in the calculation of mass, and such components may not exceed five percent of the total weight of the test probe. The impacting end of the probe, perpendicular to and concentric with the longitudinal axis of the probe, has a flat, continuous, and non-deformable  $152.4 \pm 0.25$  mm ( $6.00 \pm 0.01$  in) diameter face with a minimum/maximum edge radius of  $7.6/12.7$  mm ( $0.3/0.5$  in). The impactor shall have a  $152.4$ – $152.6$  mm ( $6.0$ – $6.1$  in) diameter cylindrical surface extending for a minimum of 25 mm (1.0 in) to the rear from the impact face. The probe's end opposite to the impact face has provisions for mounting of an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe. The impact probe has a free

air resonant frequency of not less than 1000 Hz, which may be determined using the procedure listed in Docket No. NHTSA–6714–14.

(b) The test probe for knee impacts, except for attachments, shall be of rigid metallic construction and concentric about its longitudinal axis. Any attachments to the impactor, such as suspension hardware, impact vanes, etc., must meet the requirements of § 572.136(c)(6). The impactor shall have a mass of  $2.99 \pm 0.23$  kg ( $6.6 \pm 0.05$  lbs) and a minimum mass moment of inertia of  $209 \text{ kg-cm}^2$  ( $0.177 \text{ lb-in-sec}^2$ ) in yaw and pitch about the CG of the probe. One-third (1/3) of the weight of suspension cables and any attachments to the impact probe may be included in the calculation of mass, and such components may not exceed five percent of the total weight of the test probe. The impacting end of the probe, perpendicular to and concentric with the longitudinal axis of the probe, has a flat, continuous, and non-deformable  $76.2 \pm 0.2$  mm ( $3.00 \pm 0.01$  in) diameter face with a minimum/maximum edge radius of  $7.6/12.7$  mm ( $0.3/0.5$  in). The impactor shall have a  $76.2$ – $76.4$  mm ( $3.0$ – $3.1$  in) diameter cylindrical surface extending for a minimum of 12.5 mm (0.5 in) to the rear from the impact face. The probe's end opposite to the impact face has provisions for mounting an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe. The impact probe has a free air resonant frequency of not less than 1000 Hz, which may be determined using the procedure listed in Docket No. NHTSA–6714–14.

(c) Head accelerometers shall have dimensions, response characteristics, and sensitive mass locations specified in drawing SA572–S4 and be mounted in the head as shown in drawing 880105–000 sheet 3 of 6.

(d) The upper neck force/moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572–S11 and be mounted in the head neck assembly as shown in drawing 880105–000, sheet 3 of 6.

(e) The thorax accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572–S4 and be

mounted in the torso assembly in tri-axial configuration within the spine box instrumentation cavity and as optional instrumentation in uniaxial forward-aft oriented configuration arranged as corresponding pairs in three locations on the sternum on and at the spine box of the upper torso assembly as shown in drawing 880105-000 sheet 3 of 6.

(f) The optional lumbar spine force-moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572-S15 and be mounted in the lower torso assembly as shown in drawing 880105-450.

(g) The optional iliac spine force transducers shall have the dimensions and response characteristics specified in drawing SA572-S16 and be mounted in the torso assembly as shown in drawing 880105-450.

(h) The pelvis accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572-S4 and be mounted in the torso assembly in tri-axial configuration in the pelvis bone as shown in drawing 880105-000 sheet 3.

(i) The single axis femur force transducer (SA572-S14) or the optional multiple axis femur force/moment transducer (SA572-S29) shall have the dimensions, response characteristics, and sensitive axis locations specified in the appropriate drawing and be mounted in the femur assembly as shown in drawing 880105-500 sheet 3 of 6.

(j) The chest deflection transducer shall have the dimensions and response characteristics specified in drawing SA572-S51 and be mounted to the upper torso assembly as shown in drawings 880105-300 and 880105-000 sheet 3 of 6.

(k) The optional lower neck force/moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572-S27 and be mounted to the upper torso assembly as shown in drawing 880105-000 sheet 3 of 6.

(l) The optional thoracic spine force/moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572-S28 and be mounted in the upper torso assembly as shown in drawing 880105-000 sheet 3 of 6.

(m) The outputs of acceleration and force-sensing devices installed in the dummy and in the test apparatus specified by this part shall be recorded in individual data channels that conform to SAE Recommended Practice J211/10, Rev. Mar95 "Instrumentation for Impact Tests;—Part 1—Electronic Instrumentation," and SAE Recommended Practice J211/2, Rev Mar95 "Instrumentation for Impact Tests—Part 2—Photographic Instrumentation", (refer to §§572.130(a)(3) and (4) respectively) except as noted, with channel classes as follows:

- (1) Head acceleration—Class 1000
- (2) Neck:
  - (i) Forces—Class 1000
  - (ii) Moments—Class 600
  - (iii) Pendulum acceleration—Class 180
  - (iv) Rotation potentiometer—Class 60 (optional)
- (3) Thorax:
  - (i) Rib acceleration—Class 1000
  - (ii) Spine and pendulum accelerations—Class 180
  - (iii) Sternum deflection—Class 600
  - (iv) Forces—Class 1000
  - (v) Moments—Class 600
- (4) Lumbar:
  - (i) Forces—Class 1000
  - (ii) Moments—Class 600
  - (iii) Torso flexion pulling force—Class 60 if data channel is used
- (5) Pelvis:
  - (i) Accelerations—Class 1000
  - (ii) Iliac wing forces—Class 180
- (6) Femur forces and knee pendulum—Class 600
- (n) Coordinate signs for instrumentation polarity shall conform to the Sign Convention For Vehicle Crash Testing, Surface Vehicle Information Report, SAE J1733, 1994-12 (refer to section 572.130(a)(4)).
- (o) The mountings for sensing devices shall have no resonance frequency less than 3 times the frequency range of the applicable channel class.
- (p) Limb joints must be set at one G, barely restraining the weight of the limb when it is extended horizontally. The force needed to move a limb segment shall not exceed 2G throughout the range of limb motion.
- (q) Performance tests of the same component, segment, assembly, or

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fully assembled dummy shall be separated in time by not less than 30 minutes unless otherwise noted.

(r) Surfaces of dummy components may not be painted except as specified

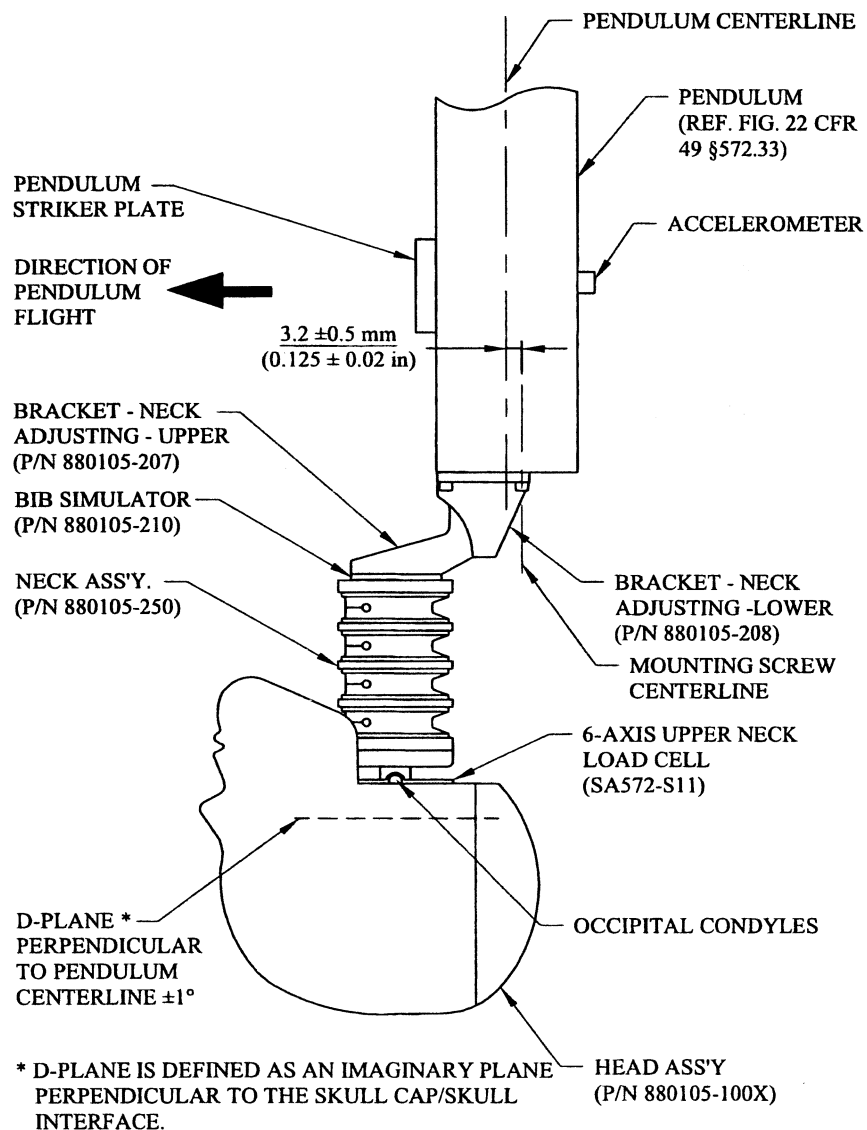
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in this subpart or in drawings subtended by this subpart.

[65 FR 10968, Mar. 1, 2000, as amended at 67 FR 46415, July 15, 2002]

FIGURES TO SUBPART O

**FIGURE O1**  
**NECK FLEXION TEST SETUP SPECIFICATIONS**



**FIGURE O2**  
**NECK EXTENSION TEST SETUP SPECIFICATIONS**

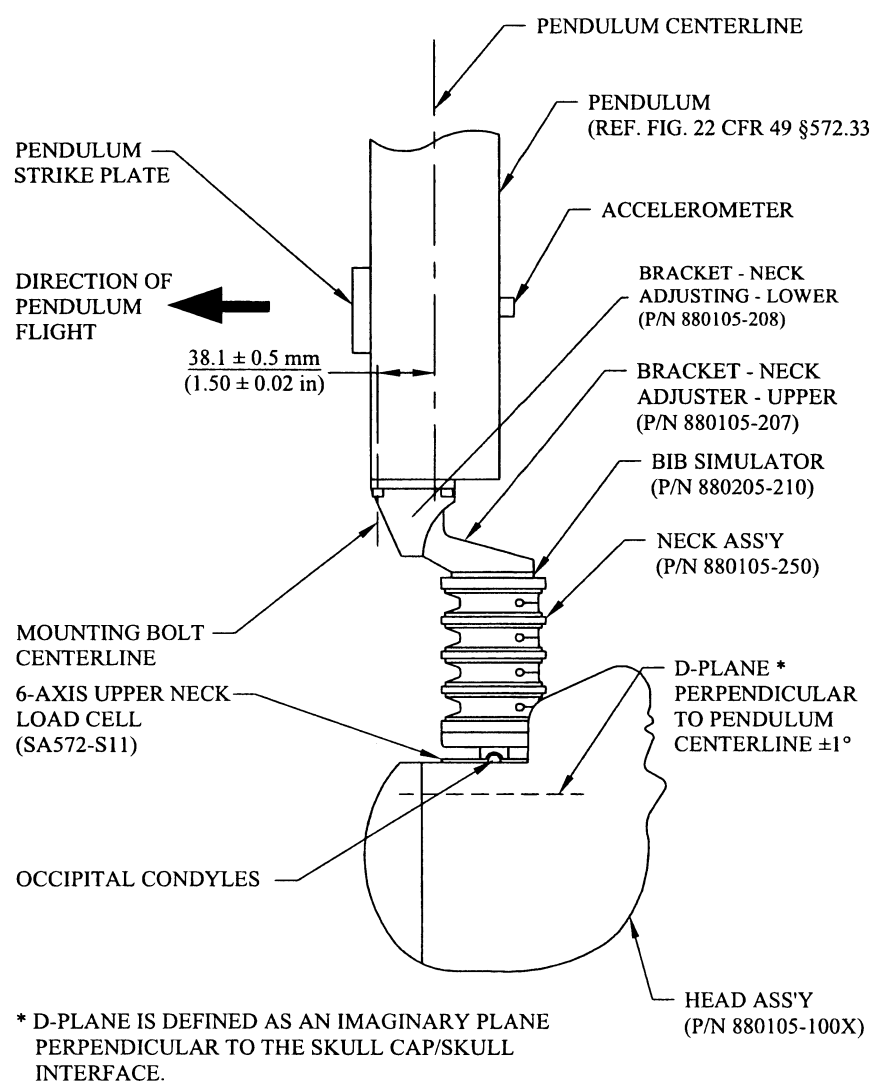


FIGURE O3  
THORAX IMPACT TEST SETUP SPECIFICATIONS

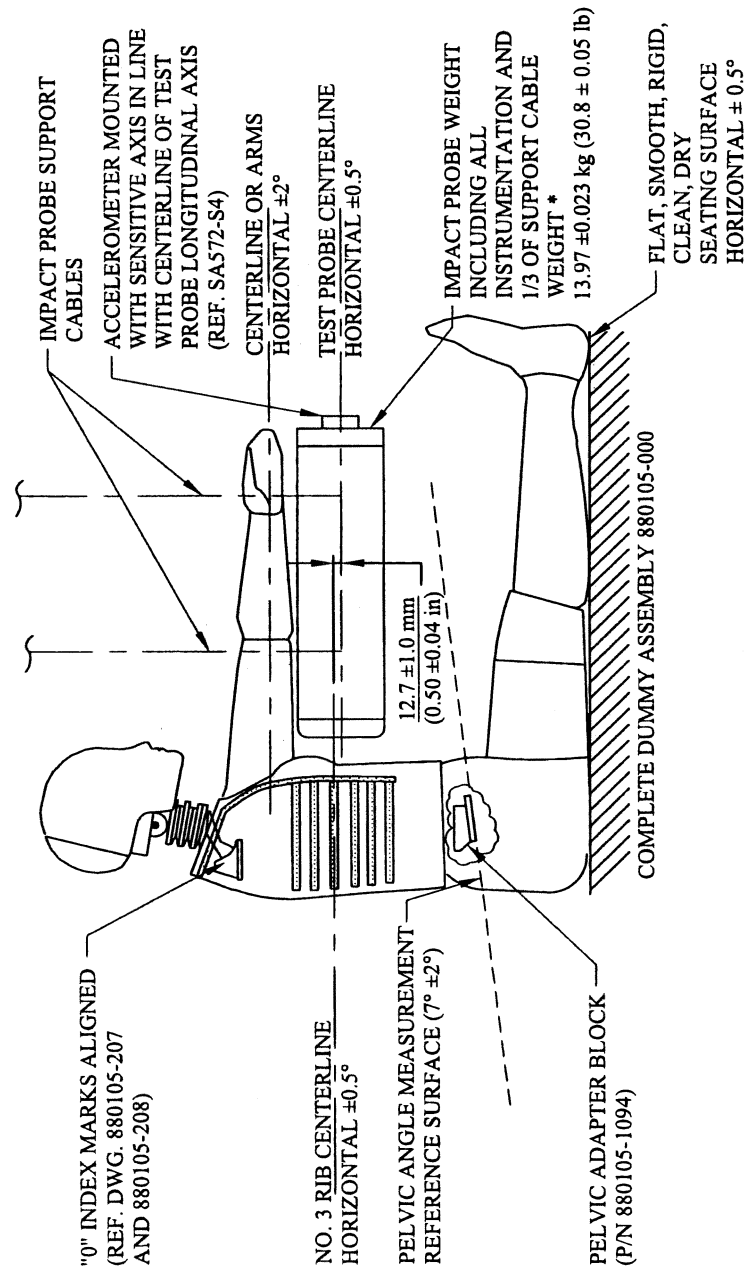
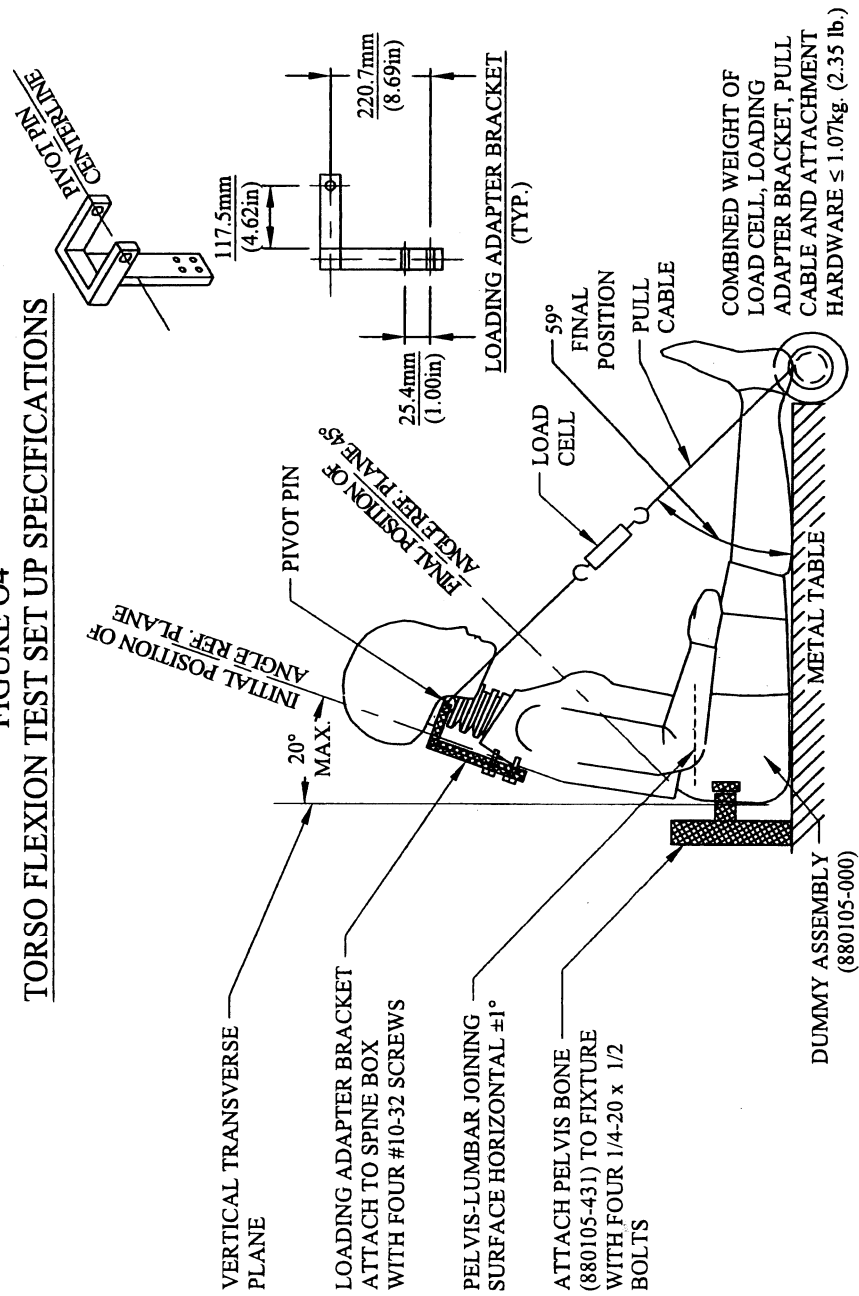
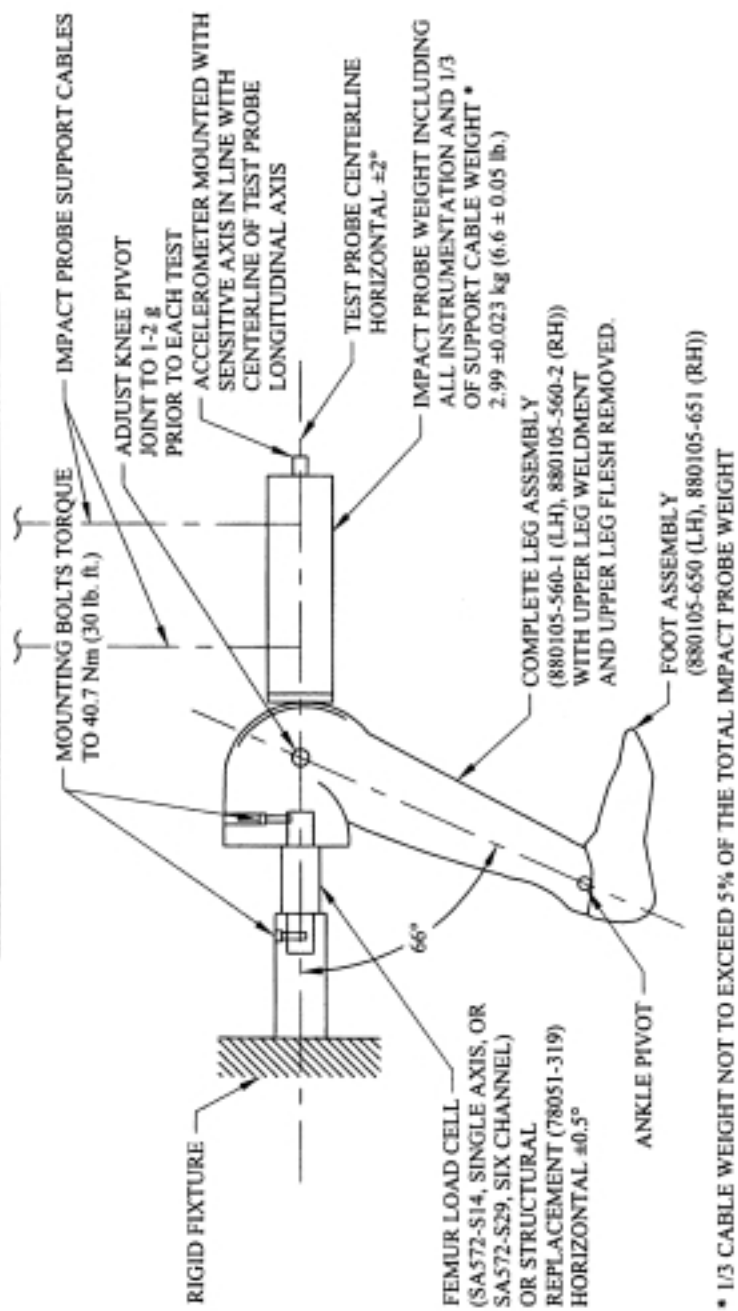


FIGURE O4  
TORSO FLEXION TEST SET UP SPECIFICATIONS



**FIGURE O5**  
**KNEE IMPACT TEST SETUP SPECIFICATIONS**





## § 572.140

[65 FR 10968, Mar. 1, 2000, as amended at 67 FR 46415, July 15, 2002]

### Subpart P—3-year-Old Child Crash Test Dummy, Alpha Version

SOURCE: 65 FR 15262, Mar. 22, 2000, unless otherwise noted.

#### § 572.140 Incorporation by reference.

(a) The following materials are hereby incorporated in this subpart P by reference:

(1) A drawings and specifications package entitled, “Parts List and Drawings, Subpart P Hybrid III 3-year-old child crash test dummy, (H-III3C, Alpha version) September 2001,” incorporated by reference in § 572.141 and consisting of:

(i) Drawing No. 210-1000, Head Assembly, incorporated by reference in §§ 572.141, 572.142, 572.144, 572.145, and 572.146;

(ii) Drawing No. 210-2001, Neck Assembly, incorporated by reference in §§ 572.141, 572.143, 572.144, 572.145, and 572.146;

(iii) Drawing No. TE-208-000, Headform, incorporated by reference in §§ 572.141, and 572.143;

(iv) Drawing No. 210-3000, Upper/Lower Torso Assembly, incorporated by reference in §§ 572.141, 572.144, 572.145, and 572.146;

(v) Drawing No. 210-5000-1(L), -2(R), Leg Assembly, incorporated by reference in §§ 572.141, 572.144, 572.145 as part of a complete dummy assembly;

(vi) Drawing No. 210-6000-1(L), -2(R), Arm Assembly, incorporated by reference in §§ 572.141, 572.144, and 572.145 as part of the complete dummy assembly;

(2) A procedures manual entitled “Procedures for Assembly, Disassembly and Inspection (PADI), Subpart P, Hybrid III 3-year-old Child Crash Test Dummy, (H-III3C, Alpha Version) September 2001,” incorporated by reference in § 572.141;

(3) SAE Recommended Practice J211/1, Rev. Mar 95 “Instrumentation for Impact Tests—Part 1-Electronic Instrumentation”, incorporated by reference in § 572.146;

(4) SAE J1733 1994-12 “Sign Convention for Vehicle Crash Testing” incorporated by reference in § 572.146.

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(5) The Director of the Federal Register approved those materials incorporated by reference in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the materials may be inspected at NHTSA’s Docket Section, 400 Seventh Street SW, room 5109, Washington, DC, or at the Office of the Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, DC.

(b) The incorporated materials are available as follows:

(1) The drawings and specifications package referred to in paragraph (a)(1) of this section and the PADI document referred to in paragraph (a)(2) of this section are accessible for viewing and copying at the Department of Transportation’s Docket public area, Plaza 401, 400 Seventh St., SW., Washington, DC 20590, and downloadable at *dms.dot.gov*. They are also available from Reprographic Technologies, 9107 Gaither Rd., Gaithersburg, MD 20877, (301) 419-5070.

(2) The SAE materials referred to in paragraphs (a)(3) and (a)(4) of this section are available from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

[65 FR 15262, Mar. 22, 2000, as amended at 66 FR 64376, Dec. 13, 2001]

#### § 572.141 General description.

(a) The Hybrid III 3-year-old child dummy is described by the following materials:

(1) Technical drawings and specifications package 210-0000 (refer to § 572.140(a)(1)), the titles of which are listed in Table A of this section;

(2) Procedures for Assembly, Disassembly and Inspection document (PADI) (refer to § 572.140(a)(2)).

(b) The dummy is made up of the component assemblies set out in the following Table A of this section:

TABLE A

Component assembly	Drawing No.
Head Assembly .....	210-1000
Neck Assembly (complete) .....	210-2001
Upper/Lower Torso Assembly .....	210-3000
Leg Assembly .....	210-5000-1(L), -2(R)
Arm Assembly .....	210-6000-1(L), -2(R)